

# Multifaceted Impact of Antimicrobial Resistance

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One of the most significant developments of 20<sup>th</sup> century which benefited the mankind enormously is the development of antibacterial therapy. In the pre-antibiotic era, the case fatality rate for bacteremia caused by *Staphylococcus aureus* was 80%,<sup>1</sup> while case fatality rate for pneumonia caused by *Streptococcus pneumoniae* was 40%.<sup>2</sup> Meanwhile around 97% of patients died<sup>3</sup> of endocarditis. Wound infections were often treated by amputation and number of amputations rose to 70% during the first world war due to complicated wound infections.<sup>4</sup>

However, on the other side, massive gains of antibiotics are badly threatened with the spread of resistance both in healthcare settings and community. Antimicrobial resistance (AMR) is the ability of microorganisms i.e. bacteria, viruses, parasites, and fungi to grow and spread even in the presence of antibiotics which were otherwise kill/halt micro-organisms. Resistance mechanisms could be modified by antimicrobial target, efflux and impermeability or enzymatic hydrolysis/degradation. Infections caused by resistant bacterial strains can be two times higher in terms of adverse outcomes compared with similar infections caused by susceptible strains.<sup>5</sup> Adverse outcomes are both clinical and economical.

Both developing and developed countries are equally affected with AMR and has increased health-care costs, length of stay in hospitals, morbidity and mortality.<sup>6</sup> According to a careful scientific estimate, around 10 million deaths will be attributed to Antimicrobial Resistance (AMR) by 2050 while around 100 trillion USD of world's economic output will be lost, if doable, sustainable and pertinent efforts are not made to curtail this threat timely.<sup>7-9</sup>

In 2014, the World Health Organization (WHO) published the "first global surveillance report

on antibiotic resistance." According to this report five out of the six WHO regions had more than 50% resistance to third generation cephalosporins along with fluoroquinolones in *Escherichia coli* and methicillin resistance in *Staphylococcus aureus*. Similarly, more than 50% resistance to third generation cephalosporins and carbapenems was reported in *Klebsiella pneumoniae*. One of the eye opening fact of the report is that around 45% of deaths in both Africa and South-East Asia are due to multi-drug resistant (MDR) bacteria. *K. pneumoniae* resistant to third generation cephalosporins was associated with elevated deaths in Africa (77%), the Eastern Mediterranean region (50%), South East Asia (81%) and Western Pacific region (72%).<sup>10</sup>

In developing countries, research on antimicrobial resistance is badly neglected. There is only one report from low-income country Senegal, two from lower-income countries i.e. Jordan and Palestine and 37 from upper-middle income countries is available.<sup>11</sup>

Antimicrobial Resistance (AMR) poses an enormous threat to global health. It not only incurs high economic costs to society but economic evaluations of antimicrobials and interventions such as diagnostics and vaccines also affect the consumption hardly include the costs of AMR which results in weak policy recommendations. Keeping in view the magnitude of problem, WHO in 2015 in 68th World Health Assembly issued 'global action plan on antimicrobial resistance' and all countries including Pakistan are the signatories which advised each country to formulate its own plan.

A situation analysis report about antimicrobial resistance in Pakistan was launched in April 2018 by Pakistan Global Antibiotic Resistance Partnership. According to this report, the major challenges/issues identified include unnecessarily large number of registered products, misleading advertisements, poly pharmacy, quacks, irrational prescribing patterns by physicians, availability of over-the-counter medicines, bias towards costly broad-spectrum antibiotics, lack of surveillance systems, lack of experts and widespread use of antibiotics in poultry, animals and agriculture.<sup>12</sup>

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It is the dire need of time that the Government of Pakistan should initiate national efforts to systematically and successfully deal with the reasons/ causes contributing to antimicrobial resistance in Pakistan.

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